

REMARKS/ARGUMENTS

Claims 1-25 stand subject to a restriction requirement in the outstanding Official Action. Claims 24 and 25 have been cancelled without prejudice and claims 4, 6, 7, 9, 12, 15 and 23 amended. Accordingly, claims 1-23 remain in the application.

Inasmuch as the present application is a national phase entry of International Application PCT/GB03/02851 and in view of the PTO "Notice of Acceptance of Application" mailed July 14, 2005, it is respectfully requested that the Examiner acknowledge Applicants' claim for priority and at least constructive receipt of the certified copy of the priority document in Office Action Summary cover sheet sections 12) a) 3.

It is additionally requested that the Examiner confirm receipt and consideration of the prior art submitted with the filing of this national phase application. Finally, it is requested that the Examiner acknowledge that the originally submitted formal drawings are accepted by the Examiner or indicate the specific reasons for any such non-acceptance.

The Examiner states that claims 18-25 are withdrawn from consideration as allegedly lacking a generic and/or linking claim. The Examiner's confirmation that Applicants timely traversed the restriction requirement is very much appreciated. Additionally, the Examiner's agreement that an "electrooptical junction," even though not explicitly recited in claims 18, 20 and 25, is necessarily present in those claims by virtue of the term definition. While this appreciated with respect to claims 18 and 20, claim 25 is believed to be an improper claim and has been cancelled by the Applicants.

In fact, Applicants have noted that numerous claims were indefinite in that they were multiple dependent claims dependent from a multiple dependent claim. Applicants have

amended claims 4, 6, 7, 9 and 23 to correct the indefiniteness such that multiple dependent claims are dependent only upon singly dependent claims, and thus, these claim amendments are believed to correct the subject matter of the claims.

Applicants have also amended claims 12 and 15 to positively recite the “insulating layer” on the handle substrate which electrically insulates the readout circuitry from the substrate. This limitation is included in independent claim 1 and independent claims 18 and 20. As will be seen, this is a linking feature patentable over the prior art which obviates the need for any election or restriction.

In section 3, the Examiner distinguishes Group I as being directed to an electrooptical junction and Group II as being directed to an implantation step for forming an electrooptical junction. The Examiner suggests that the technical feature of Group I, i.e., the electrooptical junction, is present in the Parker reference and therefore this is not a patentable distinction. (“Since Parker shows that the electrooptical junction of Groups I and II was known in the art, there is no special technical feature linking the groups.”). It is apparently upon this basis that the Examiner still believes there to be a distinction between the Group I and Group II claims.

As noted above, Applicants have specifically recited the “insulating layer” on the handle substrate which serves to insulate the readout circuitry from the substrate. This is now explicitly recited in each of Applicants’ independent claims 1, 12, 15, 18 and 20. As will be seen, this linking feature has not been disclosed in the Parker reference and therefore restriction and/or election is not appropriate under PCT Rule 13.2. The Groups I and II do relate to a single general inventive concept under PCT Rule 13.1.

In order to understand and appreciate the linking feature of the insulating layer, the Examiner must first appreciate that he has misinterpreted the teaching of the Parker reference. The Examiner considers N-type well regions 50 of Figure 1 in Parker to be the claimed first active area of the opposite conductivity type to the substrate. However, the first active area of claim 1 is part of an active electrooptical junction of an avalanche photodiode. The Parker reference teaches that the N-type wells 50 do form diodes with P-type collection electrodes 70 (see column 2, lines 5-7). However, these diode junctions do not form an electrooptical junction.

Parker teaches (see column 2, lines 8-16) that a bias voltage is applied and that a p-i-n diode is formed between the front collection electrodes 70, the intrinsic substrate region 20 and the N-type region 90 at the rear surface. Thus, it is these parts of Parker that form the electrooptically active part of the device. Well regions 50 act as Faraday shields shielding the readout circuitry from the active fields (Parker at column 1, lines 51-54 and column 2, lines 23-25). Thus, it is clear that, contrary to the Examiner's conclusion, the well regions 50 do not form part of an active electrooptical junction.

Therefore, the Examiner is incorrect in his assertion that the N-type wells of Parker constitute the first active region of the apparatus claims.

It should also be appreciated that one of the key differences between the invention of claim 1 and the device described by the Parker reference is that the invention includes an insulation layer supporting the readout circuitry. The readout circuitry is provided on a silicon-on-insulator (SOI) substrate which is located on the handle substrate of bulk silicon. The use of SOI substrates allows CMOS readout circuitry to be provided on the insulating layer and the avalanche photodiode (APD) to be provided in the bulk silicon handle wafer. CMOS circuitry

operates at a lower operating voltage than APDs and the high bias voltage can interfere with correct operation of the CMOS circuitry if there is no proper electrical isolation.

As discussed above, the Parker reference provides this insulation by providing N-type wells to provide electrical shielding of the circuitry. As this is a known solution to the electrical shielding problem as discussed in the present application at page 3, line 30 through page 4, line 1, the use of such wells limits circuit design options. Applicants' use of a separate insulating layer as set out in independent claims 1, 12, 15, 18 and 20 accomplishes the electrical shielding function, but permits the full range of circuit design options. Thus, the use of an "insulating layer" in each of Applicants' independent claims is a patentable feature not disclosed in Parker (and in fact Parker would lead one away from such feature) and serves to link all independent claims 1, 12, 15, 18 and 20.

In view of the above, the Examiner's contention that there is no linking of this single general inventive concept under PCT Rules 13.1 and 13.2 is respectfully traversed and this is one basis for traversing the restriction/election requirements.

Additionally, the Examiner's contention that there are 18 different species of the present invention is respectfully traversed. As noted above, the single general inventive concept, i.e., that the provision of an APD in a substrate together with readout circuitry isolated from the substrate by an insulating layer is present in each of Applicants' independent claims, i.e., claims 1, 12, 15, 18 and 20. Thus, all claims share this single feature and comprise the same invention, but differing in scope. In view of this single linking feature, the Examiner's requirement for election of a single species is improper and should be withdrawn.

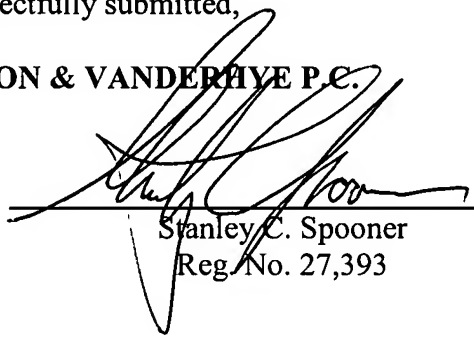
Accordingly, and only because it is required by the Examiner and the US PTO rules, Applicants elect with strenuous traverse Group I, claims 1-17 and 24, but suggests that, as amended, remaining claims 1-23 are in this group. Applicants also elect with traverse Species 2, reading on Figure 3 and at least claims 1-8, 12-14, 18 and 19 are believed readable on Species 2. Again, this requirement is traversed on the grounds that all of the alleged Species 1-18 share the common features of generic claim 1 and relate to the same invention. It is noted that independent claim 1 along with independent claims 12, 15, 18 and 20 are generic to all 18 species identified by the Examiner.

Having responded to the restriction/election requirements in the outstanding Official Action, it is submitted that remaining claims 1-23 are in condition for allowance and notice to that effect is respectfully solicited. In the event the Examiner is of the opinion that a brief telephone or personal interview will facilitate allowance of one or more of the above claims, he is respectfully requested to contact Applicants' undersigned representative.

Respectfully submitted,

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